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AGRICULTURAL MEMORANDUM NO. 616

Sequences of dry days for grass conservation in Lancashire and Yorkshire

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BACKGROUND

Two-day dry spells for first-cut silage were examined in Agricultural Memorandum No. 547. This brought requests for similar information for sequences of one to five dry days, and for the whole conservation season (May - early September in this region).

PROCEDURE

Ag. Mem. 547 dealt in "pick-up days", ie the second day of a two-day dry spell. In dealing with sequences of different length, it is more convenient to count the first days of the sequences, since these are the days on which the farmers' decisions to cut or not are made. These days are here called "starting days".

Half months from the beginning of May to mid-September were used, defined by

1st half: 1st - 15th inclusive
2nd half: 16th - end of month

Thus the second halves of May, July and August are 16 days long, and all the other half months are of 15 days.

In all other respects the procedure were exactly as in Ag. Mem. 547, as were the stations and periods used.

RESULTS

When the tables for the six stations were assembled, it was evident that variability from year to year and with time of year was much greater than from station to station. It was therefore possible to amalgamate the results for two pairs of stations which were not significantly different. The grouping which emerged is shown in Table 1.

Table 1

Grouping for this paper	Stations	Area represented	Period	Height in ft above MSL
Western Lowlands	Morcambe	Lowland Lancashire	1951-70	23
Western Uplands	Stonyhurst	West Pennines	1951-70	377
Eastern Uplands	Harrogate High Mowthorpe	East Pennines Yorkshire Wolds	1951-70 1951-70	550 570
Eastern Lowlands	Cawood Hull	Vale of York Holderness	1953-72 1951-70	20 8

Mean numbers of spells were calculated to 0.1 day, but whole units were used for frequencies 1 year in 4, 3 years in 4, and 9 years in 10, as these are less well determined statistically. Where two stations' results were amalgamated, some values of 0.5 day arose. In rounding, some attention was paid to obtaining a smooth variation through the tables. For the spells of three days and upwards, for which in bad years the values are very low, the draft tables gave in some instances the same frequency (0 or 1) for 3 years in 4 and 9 years in 10. To avoid this misleading impression, use was made of the symbols 0+ and 1+, which are defined at the foot of the final tables 2 and 3.

DISCUSSION

Whether a day has measurable rain (ie less than 0.01 inch) is only a partial guide to its suitability for conserving grass. A small amount of rain may be no practical importance. On the other hand, a technically "dry" day may be very humid and with low solar radiation. To some extent these two will cancel. It is probable that not counting days with small amounts of rain, tends to make the number of longer spells unrealistically low. Thus, one light fall of rain in a week of fine weather, may rule out several five-day spells. The period may nevertheless have been satisfactory for conventional hay-making.

However, the above objections apply equally to all stations and times of year. Comparisons between stations and between different periods are likely to be realistic, as are the assessments of the year-to-year variability.

Tables 2 and 3 show that generally the Eastern Lowlands have most dry sequencies followed by the Western Lowlands and the Eastern Uplands, the Western Uplands having least. The differences are rather small, the significant difference in climate (not shown by the tables) being in the amount of rain which falls when it does rain, and in the available solar energy on the dry days.

In all areas the second half of May and the first half of June stands out as the best time for conservation. Dry sequences are at a maximum, and so is solar energy (increased cloudiness gives less sunshine after the summer solstice than before). It is interesting that at this time grass is at its most nutritious, the concurrence showing clearly why grass is the main conservation crop in Northern England. The second half of the July and the second half of August are the next most favourable periods, the first halves of these two months being distinctly inferior. The first half of September is not to be despised for a late cut, provided the shortening days and the increased liklihood of heavy dews are borne in mind.

The opportunities for conservation decrease rapidly as the length of dry sequence required goes up. Typically, the number of five day sequences is only a third of the number of single dry days. Every farmer would hope to be able to cope reasonably with his conservation three years in four, but the tables show that in the fourth year he may get one or less five-day sequence per fortnight. Conventional haymaking is therefore an unreliable business throughout the region and irrespective of time of cutting.

For the shorter dry sequences (required for silage, either direct cut or wilted) there is still considerable year-to-year variation, but its effect is not disasterous. Only one year in ten will the number of dry days fall below 2/3 of the mean. For two-day sequences (wilted silage) this will occur one year in four.

FURTHER WORK

The mean frequencies, and those attained 1 year in 4 and 3 years in 4, vary in a regular way with the length of spell. This opens up the prospect that eventually all the statistical information on conservation possibilities at a station, could be rapidly estimated if one knew only the mean frequency of raindays there. This would save much tedious statistical work.

Any comments or suggestions on this paper should be sent to the first-named author.

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Table 2 Frequency of starting days for dry sequences of different lengths in the western half of the Lancashire and Yorkshire Region.

Dry sequences of:-	1 day				2 days				3 days				4 days			5 days		
WESTERN LOWLANDS Period	mean	1 yr in 4	3 yrs in 4	9 yrs in 10	mean	1 yr in 4	3 yrs in 4	9 yrs in 10	mean	1 yr in 4	3 yrs in 4	9 yrs in 10	mean	1 yr in 4	3 yrs in 4	mean	1 yr in 4	3 yrs in 4
1st half of May	7.1	9	5	3	4.7	7	3	2	3.5	6	2	1	2.9	5	1+	2.3	5	0+
2nd half of May	9.9	13	8	7	7.3	11	5	4	5.7	9	4	2	4.9	8	3	4.1	7	2
1st half of June	9.5	12	9	8	6.9	9	5	5	5.5	8	4	3	4.3	7	2	3.3	7	1+
2nd half of June	7.7	10	6	5	5.0	7	4	3	3.3	5	1+	1	2.3	4	1+	1.8	2	1
1st half of July	7.7	9	7	6	5.1	7	4	3	3.4	5	2	1	2.3	4	1+	1.6	3	1
2nd half of July	8.7	11	7	5	5.7	8	3	2	4.1	6	2	1	3.1	5	1+	2.3	3	1
1st half of August	6.9	10	5	4	4.1	7	3	2	2.5	5	1+	1	1.7	3	1+	1.3	2	0+
2nd half of August	8.5	11	6	4	5.3	7	3	2	4.0	6	2	1	3.1	5	1+	2.4	4	1
1st half of September	7.3	10	6	4	4.8	7	3	2	3.5	6	2	1	2.7	5	1+	2.3	4	1
WESTERN UPLANDS																		
1st half of May	6.5	9	4	3	4.3	7	2	1	2.9	5	2	1	2.0	4	1	1.3	3	1
2nd half of May	9.1	12	8	7	7.8	10	5	3	5.5	9	3	2	4.7	8	2	4.1	7	1
1st half of June	8.4	10	7	6	5.9	8	4	3	4.5	7	3	2	3.5	6	2	2.5	5	1
2nd half of June	6.3	9	5	4	3.8	6	3	2	2.5	4	1+	1	1.5	3	1	1.1	3	1
1st half of July	5.8	7	4	3	3.4	4	2	1	2.0	3	1+	1	1.2	2	1	0.8	1	0+
2nd half of July	8.2	11	6	5	5.1	7	3	2	3.5	5	1+	1	2.5	3	1	1.9	2	1
1st half of August	6.3	9	4	3	3.9	7	2	1	2.4	5	1+	1	1.7	3	1	1.1	2	1
2nd half of August	7.7	11	5	4	5.1	8	2	1	3.9	6	1+	1	3.0	5	1	2.5	4	1
1st half of September	6.3	10	5	3	4.0	7	2	1	2.7	5	1+	1	1.8	3	1	1.3	2	0+

0+ is between 0 and 0.5. 1+ is between 1 and 1.5. See text for details of rounding.

Table 3 Frequency of starting days for dry sequences of different lengths in the eastern half of the Lancashire and Yorkshire Region.

Dry sequences of:-	1 day				2 days				3 days				4 days			5 days		
EASTERN UPLANDS Period	mean	1 yr in 4	3 yrs in 4	9 yrs in 10	mean	1 yr in 4	3 yrs in 4	9 yrs in 10	mean	1 yr in 4	3 yrs in 4	9 yrs in 10	mean	1 yr in 4	3 yrs in 4	mean	1 yr in 4	3 yrs in 4
1st half of May	6.7	9.5	4.5	2.5	4.8	7.5	2.5	1.5	3.7	6.0	2.0	0.5	2.7	4.5	1.5	2.1	3.5	1.0
2nd half of May	9.9	13.5	8.5	6.5	7.3	11.0	4.5	4.0	5.7	9.0	3.0	1.5	4.7	8.0	1.5	3.9	7.0	1.0
1st half of June	8.9	11.5	7.0	5.5	6.5	9.5	4.0	3.0	4.9	7.5	3.0	2.0	3.8	6.5	1.5	3.0	5.0	1.0
2nd half of June	8.0	10.5	7.0	4.5	5.5	8.0	4.0	2.5	3.9	6.5	2.5	1.0	2.9	5.0	1.5	2.1	4.5	1.0
1st half of July	7.5	10.0	6.0	5.0	4.6	7.5	3.0	2.0	3.0	5.0	1.0	0.5	1.9	3.5	1.0	1.2	2.0	0.5
2nd half of July	8.7	11.5	7.0	5.5	5.3	9.5	4.5	4.0	4.6	7.0	3.0	2.0	3.3	5.5	1.5	2.4	4.0	1.0
1st half of August	7.1	9.5	5.5	4.0	4.1	6.5	2.5	1.5	2.7	4.5	1.0	0.5	1.9	3.5	1.0	1.4	2.5	0.5
2nd half of August	8.6	11.0	6.5	5.5	5.7	8.0	3.5	2.0	4.1	6.0	2.0	1.0	3.0	4.5	1.5	2.3	3.5	0.5
1st half of September	7.5	10.0	6.5	5.5	4.9	8.0	4.0	2.5	3.3	6.0	2.0	1.0	2.3	4.0	1.5	1.7	3.5	1.0
EASTERN LOWLANDS																		
1st half of May	8.1	11.5	6.0	4.5	5.7	8.5	3.5	2.0	4.3	7.5	2.5	1.5	3.3	6.0	1.5	2.5	5.0	0.5
2nd half of May	10.1	13.5	8.0	6.5	7.9	11.0	5.0	4.0	6.5	9.5	4.0	2.5	5.4	8.0	3.0	4.5	7.0	2.0
1st half of June	9.9	12.5	8.0	6.5	7.3	10.5	4.5	3.5	5.7	9.5	2.0	1.0	4.6	8.0	1.0	3.7	7.5	1.0
2nd half of June	8.6	11.0	7.0	5.0	6.3	8.5	4.0	3.0	4.7	7.5	2.5	1.5	3.4	5.0	1.0	2.5	4.0	0.5
1st half of July	8.8	11.0	7.5	6.5	6.1	8.5	4.0	3.5	4.1	6.5	2.5	2.0	2.7	4.5	1.0	1.7	3.5	0.5
2nd half of July	10.0	12.5	8.0	7.5	7.1	9.5	5.0	3.5	5.1	7.5	3.0	2.0	3.7	6.0	2.0	2.7	5.0	1.0
1st half of August	7.4	10.0	6.0	4.5	4.3	6.5	2.0	1.0	2.8	5.0	1.0	0.5	1.9	4.0	0.5	1.3	3.0	0+
2nd half of August	9.3	12.0	7.5	5.5	6.5	10.0	3.5	1.5	4.9	8.0	1.5	1.0	3.9	6.5	0.5	3.1	5.5	0+
1st half of September	8.7	11.0	8.5	6.5	6.1	9.0	4.5	3.5	4.5	8.0	2.5	1.5	4.5	6.0	2.0	2.7	5.0	1.5

0+ is between 0 and 0.5. Means are expressed to 0.1 day and other frequencies to 0.5 day.
See text for details of rounding.